VOL. XII. No. 2. JANUARY 21, 1915

THE JOURNAL OF PHILOSOPHY
PSYCHOLOGY AND SCIENTIFIC METHODS

WHAT IS BEHAVIOR?

THE term behavior sometimes denotes such phenomena as the action of oxygen or the motion of a comet, just as at other times it refers to the actions of organisms. Consequently, it is not possible clearly to mark off the subject-matter of psychology by this term alone, because it is not possible to do whatever we please with the established meanings of words. Accordingly, it has been suggested that psychology be defined as the science of the kind of behavior that exhibits character and intelligence. Here are, however, two terms of varied and complex usage that need definition as much as does behavior. To exhibit character may mean to possess positive traits and so apply to behavior, but in the same sense it applies to everything that can be an object of thought; and in what sense can the behavior of lower organisms be said to display intelligence? How are we to understand the character and intelligence of many of the lower organisms with which comparative psychology has to do? To make the question concrete, In what sense can the behavior of white mice be said to display these two traits? From the genetic point of view, character and intelligence may be said to be results and outcomes of behavior rather than its fundamental attributes. Consequently, it seems clear that these two terms are too vague to serve as differentiæ of the kind of behavior the psychologist is interested in.

For the science of biology, accommodation and habit are fundamental traits of behavior, and to the present writer they once appeared to be sufficiently simple and definite to satisfy the needs of psychology also. But the more closely these laws are examined the less do they seem to express the real inwardness of psychological behavior. Selection and repetition are still simpler terms and stand closer to the essence of the matter. All living, whether organic or mental, involves selection and repetition among the acts of individuals and species. Habit is the tendency of living things to get again a good that has once been achieved; accommodation, the tendency to prefer more adequate procedures, the tendency of living

things to pursue a larger good. In the great majority of organisms both processes are unreflective, and among reflective beings both become less reflective as they become more habitual. Reflection appears when habit and accommodation prove to be inadequate ways of meeting the conditions of life.

Both habit and accommodation have been represented as purely physical and chemical phenomena. In Spencer's psychology reactions to stimuli are determined in the first place by the energy of the stimuli and the physical properties of the organism. A wave of molecular change follows "the line of least resistance" and issues in movements the energy of which is equivalent to the energy of the stimuli acting under the conditions of their transmission through the organism. Repetitions of the stimuli bring about repetitions of the movements, because "the line of least resistance" will have been rendered "more permeable" by the first process. Thus habits are established and habits induce nerve fibers and psychophysical organization.

In criticism of this description of mental life in terms of physics and chemistry, it has been pointed out that stimuli do not recur in the regular and periodic manner here presupposed. Growth takes place not so much by favor of a fostering environment as in spite of one that does not foster it. Life is from first to last and in all its phases a struggle. The life of an organism is a process of *getting* the proper stimuli rather than a passive reception of them from without. A certain power of selection, as well as repetition, appears to be characteristic of living tissue everywhere. Organisms react to stimuli not so much according to the nature of the stimuli as according to their own nature, and growth takes place by reacting to old stimuli in new ways as often as by reacting to new stimuli in old ways. It is the problem of the science of biochemistry to describe this process in terms of molecular change; but for other branches of biology and for the kindred sciences of human life, the fact that organisms singly and in groups behave in ways that tend to keep up and maintain the organism and its species is most fundamental.

Habit is not distinct and separate from accommodation and selection. Stereotyped repetitions of previous activities do not, as a rule, occur in actual living; actual living is a continual reformation of habitual tendencies. Among all higher organisms imitation and suggestion operate to modify congenital systems of active tendency, and so render life social. It has for years seemed to the present writer that the science of psychology, based as it usually is on the reflex arc conception of psychophysical activity, should adopt a new foundation. The reflex arc with its afferent, central, and motor segments is an attempt to describe mental life in terms of matter and motion,—

that is to say, it is an attempt to conceive mental phenomena as mere redistributions of energy. The latter is the problem of biochemistry and of that branch of biology known as physiology. If psychology is to have in the future a distinct field, it must start with the fact so obtrusively manifest in the phenomenon called value, the fact, namely, that all mental life tends to conserve itself by getting and keeping its own appropriate stimuli. The fundamental fact of mental life is the fact of value, the tendency of psychic organisms first to select and then keep within their control whatever is necessary to their life. This is not a mechanistic reflex, but a self-maintaining act.

Since 1898 I have for convenience used the word *aesimation* to designate this type of behavior. It is more comprehensive than the word consistency, being the general form of prereflective as much as that of reflective psychoses. It is more comprehensive than instinct or impulse, character or intelligence. The word impulse, especially in the German rendering, *Trieb,* has a similar meaning, but this does not properly denote the higher and more complicated mental functions. The significance of aesimation is enormously increased by imitation and suggestion. When life reaches the stage of organization at which it is possible for organisms to set and receive copies imitatively, the stage at which the tendency to seek and follow such copies is well established, the process of aesimation operates to render the individual susceptible to the influence of tradition and the institutions of his group. It is then that character, in the sense of habitual social correlations, appears, and the consciousness develops of a kind of being and of a world of common experience with which the individual is identified. From the standpoint of this common type of being and common world, all the actual contents of attention have meaning and value. And this is intelligence. It is this consciousness of the kind of being to which one belongs and of a world that is shared in common with all others of one's kind that constitutes the essence of personality; for every genuine person knows himself without make-believe to play a human rôle. This is the basis of the moral sense, and here too is to be found the psychological foundation for those norms of logical and esthetic value which find expression and application in science and art. We can say, therefore, that psychology is not primarily concerned with self or character or intelligence: the science is primarily concerned with the type of behavior which we have here called aesimation: but this type of behavior is of such nature that by growth and development it unfolds into all these forms of life. And when so regarded, intelligence and character cease to be a sort of inner world, comparable to a glass aquarium with gold-fish swimming in it, that every one carries about with him.

The advantage of this conception of the subject-matter of psychology seems to me to be threefold. In the first place it gives to the science a unity that it now lacks. The psychologist is compelled to-day to incorporate in his treatment of his subject several chapters that are taken directly from the works of anatomists and physiologists, and it must ever be a reproach to the subject that he can not devote his attention to what he now accepts as his proper field, namely, the phenomena of consciousness. Once conceive the subject as a science of a certain type of behavior, and references to the physical and physiological conditions under which such behavior is possible become logically relevant to his treatment. In the second place, this point of view gives to the development of the subject something of the interest of a continuously unfolding plot. Where treatises on psychology are to-day collections of treatises which inevitably seem to the neophyte to be more or less unrelated except by the accident of their being included within the covers of a single book, the whole subject would gain enormously in continuity of development. Lastly, such a treatment will tend to give to the subject something of the vividness and reality of life itself. There are no problems that are germane to the subject at all that can not be treated from this point of view, and we might add that such a treatment would not prepossess the minds of young students with conceptions that tend to stop all effective thinking on the deeper issues of life.

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IDEO-MOTOR ACTION: A REPLY TO PROFESSOR MONTAGUE

PROFESSOR MONTAGUE'S very ingenious criticisms of my arguments against the truth of the ideo-motor theory obviously require that I either recant or retort, though in my opinion experiment rather than discussion is what the problem really needs.

Montague is not interested in the arguments which I used to show that in fact ideas do not tend, apart from bonds accounted for by the laws of instinct and habit, to produce movements like themselves any more than any other movements, but confines his criticism to certain data that I introduced to show "that its own apostles think more highly of it the less clearly and emphatically it is stated, and even believe that the power of an idea's likeness to the movement to produce that movement is in inverse ratio to the amount of likeness," and further to show why the theory, if unsound, was able to "gain credence and why it is still cherished."

Montague's first criticism is as follows: In arguing from the fact that psychologists rank the second of each of the series of statements below as truer or less false than the first to the conclusion that the less emphatically and clearly the ideo-motor theory is stated the more acceptable it is, Thorndike neglects the fact that "other things being equal, the more complex an event the less its antecedent probability; and the more complex the elements asserted in a proposition the greater the possibility of error and the less the probability of truth."

SERIES A

1. A movement idea is the revival, through central excitation, of the sensations, visual, tactile, kinesthetic, originally produced by the performance of the movement itself. And when such an idea is attended to, when, in popular language, we think hard enough of how the movement would "feel" and look if it were performed, then, so close is the connection between sensory and motor processes, the movement is instituted afresh.

2. If a child or a primitive man has a vivid idea of a movement of his own body, that movement is thereby made unless it is prevented by some contrary idea.

SERIES B

1. To make your spear fly straight and pierce the breast of your enemy, it is useful to think hard of the visual, tactile, and kinesthetic sensations originally produced by the performance of the movement itself.

2. To make your spear fly straight and pierce the breast of your enemy, it is useful to imagine the spear striking him full in the breast.

Whether or not I attached due weight to the formal differences between these statements and between the several members of other similar series used, it is not for me to say. I may have forced the interpretation of the ratings somewhat to the partial neglect of formal features.

Montague, however, neglects three matters, each of far greater consequence than this complexity-improbability feature. He neglects the fact that the opinions of psychologists favor statements of the ideo-motor theory *as a principle,* but deny the theory *in concrete cases where its application is sufficiently hidden,*—and do so irrespective of the complexity factor. He neglects also the fact that the laws of connection-forming by exercise and effect fit their average opinion by such concrete hidden cases as fully as the law of ideo-motor

action or connection-forming by similarity goes contrary to it. He neglects also the fact that the ratings which controverted the ideo-motor theory did so in spite of the general tendency of men of science to be suspicious of the truth of general, indefinite, and vague statements.[1]

It is, of course, true that these judgments of relative truth are, in any one case, far from being an exact account of the opinions of the psychologist in question—that misunderstandings, over-weighting of certain features of a statement, carelessness, and the like may play important rôles. It is true that certain constant errors may creep in. A mere counting of votes without an intelligent watchfulness concerning the circumstances of the voting would be risky. But a committee of impartial men of science reading the ratings and their annotations, would, I am sure, conclude that American psychologists, though voting for the ideo-motor theory as a general principle, (1) think less well of it the more clearly it is interpreted as a doctrine that likeness creates bonds in behavior rather than as a vague doctrine that, for one reason or another, the laws of exercise and effect possibly included, we tend at times to make movements that we think of, and (2) accept explanations of concrete cases of action in an order of preference which the likeness theory fits far less well than its opposite.

Montague's second section argues that likeness is, in general, potent, that "All affects are in some degree like the causes," that "echoes, reflections, and . . . reproduction . . . in living matter," photographs, electrical induction and conduction" are cases of this general potency, and that the savage's mistake was primarily his ignorance of "the necessity of nerve-fibers as the medium necessary for the execution of one's plans or ideas."

In general, "The cause A by transmitting energy through a medium M produces an effect A'. What the qualities constituting the effect A' will be, depends upon the antecedent qualities of the cause A and also upon the medium M. In brief, $A'=f(A, M)$. If M were perfectly transparent, or if its distortions corrected one another, A' would be exactly similar to A. And conversely, the extent to which in a given case the effect fails to duplicate the qualities of its cause depends upon the distorting influence of the medium.

[1] For example, a vote as to the relative truth of statements 1 and 2 below would probably be *in favor of* the first.

1. To make an estimate of where you are at sea, it is useful to calculate the latitude and longitude of the place where you are.

2. To make an estimate of where you are at sea, it is useful to make calculations concerning where you are.

Now between a given act and the psycho-cerebral state which we designate the 'idea of' that act there is a resemblance. The neural mechanism connecting the two events furnishes a perfectly good medium by means of which the psycho-cerebral cause can produce its physical effect. Experience seems to show that ideal anticipations of simple bodily movements are as a matter of fact followed by the movements themselves.''

I am ignorant about causes, media, transmitting, effects, and the like, and will not discuss the general potency of likeness to do anything in nature. To the particular case of the likeness of an idea to a movement, however, I have given some attention and have tried in the paper in question to prove that experience seems to show that ideal anticipations of simple bodily movements are followed by the movements themselves only when the neural correlate of the ideal anticipation or some part thereof connects with the act in question as a result of the original constitution of the nervous system or the modifications produced in it by use, disuse, and the results thereof, accident, disuse, drugs, and the like. Since in man's original constitution there are no bonds leading from ideas of acts to these acts, this leaves likeness impotent. I will not repeat the evidence here. Experimentally I am unable to produce an act by imaging it or thinking of it unless the act has been connected already as sequent to the image or thought in whole or in part by past habit-formation, nor am I acquainted with any experiment that has succeeded in doing so. The closeness and surety of the connection in cases where ideas do evoke acts seem to show zero correlation with the amount of likeness between the members of the pair and a very high correlation with what would be expected from the laws of exercise and effect and their subsidiaries.

Lest I may seem to have used my ignorance about general concepts of causes, media, and the like to avoid Montague's claim that likeness might be expected to be potent in human behavior because it is potent in nature generally, I will try to refute it in his favored case —the reproduction of living forms. A single cell A, grows, divides, producing two, in part like the first, because they *are* the first with some changes. This continues and A^2, one of the eventual subdivisions of the original A, separates from the mass and, alone or in combination with another cell B^2 (separated off in a similar manner as an eventual subdivision of B), becomes what we call the next generation. What did likeness do? Nothing that I can discover. If the fact that one half of a chromosome was like another half made them split longitudinally, or if the fact that two cells, x and y, were alike made x resist the action of some environmental cause of variation un-

less y also was being acted on by it, or if the fact that certain cells x and y were alike made x and y in any degree or manner respond alike to different situations or differently to an identical situation so as to maintain their likeness, the likeness of parent to offspring could be intelligibly and usefully said to have done something in reproduction. But nothing of this sort occurs. All the effect of likeness seems to be fully taken account of by the simple statement that two bits of chromatin that are alike stay alike until something makes them different, retaining those identical elements which are not altered. The child is like the parent by heredity simply and solely because he is a later off-shoot of the same chromatin that grew into the parent. And in general I should say that any facts which seem superficially to show likeness as dynamically potent will be found to show only such truisms as that like things stay alike unless made different, that if two things are alike they will produce like effects under like circumstances, and the like.

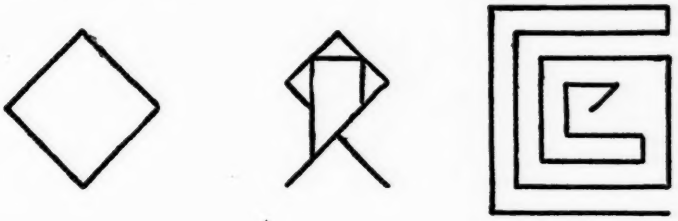
In a third section Montague objects that "the denial of ideo-motor implies a denial of the possibility of imitation and finally of perception itself."

The denial of ideo-motor action does not, in my opinion, imply such a denial, the two issues being different and requiring different evidence for solution, but I do in fact deny that the perception of an act performed by another has any *general* potency to produce the act in the witness. Apart from certain special instincts such as " smiling when smiled at, laughing when others laugh, yelling when others yell, looking at what others observe," etc., and from acquired habits wherein the perception of an act's performance by another has become the situation productive of that act in the witness, imitation of the sort required does not, so far as I can see, exist. The evidence I have presented in some detail elsewhere.[2] I find no evidence that "Gestures, accents, and rhythm in general are imitated spontaneously."

The cases of what Montague calls voluntary imitation such as "the painting of a picture of any objective situation, or the repetition of a sentence" are, of course, real. They do not, however, seem to me "difficult to explain without admitting a tendency of perceptions to reproduce their like." On the contrary, the facts observed in teaching children to write or draw from models seem to me to be beautiful examples of the impotence of a perceived relational scheme to organize the elements in behavior, except as the laws of exercise

[2] "The Original Nature of Man," Chapters 8 and 12.

and effect allow. A child who can draw straight lines is *not* enabled to draw figures like these



by the mere perception of the figures. Relating the straight-line responses to fit the demands made by the models requires organizing bonds, and these are formed under the laws of exercise and effect just as truly, though not as clearly, as any bonds.

Montague's argument in the case of perception is that admittedly "perceptions have a relational similarity or one-to-one correspondence with their causes," and that this correspondence or relational similarity would be impossible if the likeness of an object to the perception of the object had no share in causing the object to evoke in man the corresponding percept.

The disagreement, of course, concerns the causation of the correspondence. As I see it, the sensorial and perceptual features of a man's response to any situation are caused nowise differently from any other features of his response. The human animal *sees* what he *sees* when a lion jumps at him or a baby nestles against him for just the same reasons that he then shrieks and runs or smiles and fondles; the likeness of the real lion to the first visual perception and the likeness of the baby to the second being of zero potency both in producing the shriek or smile and in producing the perceptual elements of the response.

Any further justification here of the view of the dynamics of human thought and action which my attack on the ideo-motor theory illustrated would probably be less instructive than the systematic presentation of the view which I have elsewhere made.[3]

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[3] "The Original Nature of Man," Chapters 1, 2, 5 to 14, "The Psychology of Learning," Chapters I to V.

A REPLY TO SOME CRITICISMS OF THE DELAYED REACTION

ALTHOUGH Professor Watson in his recent book[1] has given a very sympathetic account of a study[2] once made by the present writer, there are certain points in that work which seem to have been misunderstood, and others where additional comments may now be made with profit. The crux of the matter lies in the ascription to raccoons of a process which functions as an idea does in human behavior. "By applying the term 'ideas' to these cues, I mean that they are similar to the memory idea of human experience so far as *function* and *mechanism* are concerned. They are the residual effects of sensory stimuli which are retained and which may be subsequently reexcited. The revival, moreover, is selective and adaptive to the solution of a definite problem, and when aroused they function successfully as a necessary substitute for a definite component of the objective stimulus aspect of the problem."[3] This conclusion was based upon two bulwarks: (1) no external stimulus was present that could be the essential condition of a successful delayed response; and (2) there was no observable portion of the raccoon's body which remained in a constant orientation during the interval of delay. The first argument forced the writer to look for the essential cues within the animal's body. The second argument made it probable that the cue was one which could be reinstated, *i. e.*, one which was not present continuously during the interval of delay. This last conclusion can never be made with absolute certainty because certain motor sets which were not and could never be visible may have been constantly maintained. However, this constant maintenance was thought further improbable because successful reactions were made, although the animal had been violently distracted during the delay.

Professor Watson takes me to task gently under both of the above heads. He says, with respect to the absence of continuous bodily orientation, "On the other hand, *several*[4] of the responses of the raccoons and all of the responses of the children offered a mode of behavior which can not be explained in the terms of maintained bodily attitude" (p. 227). Again, it is possible "that there was an actual error in observation. Most of the raccoons were admittedly making the correct reaction upon the basis of maintained bodily orientation." The word "several" would suggest that the number was small and

[1] Watson, Jno. B., "Behavior: An Introduction to Comparative Psychology," Holt and Co., N. Y., 1914.

[2] Hunter, Walter S., "The Delayed Reaction in Animals and Children," *Behavior Monographs*, Vol. 2, No. 1, 1913.

[3] "Delayed Reaction," page 73.

[4] Italics mine.

could be accounted for by chance. Yet if the reader will refer to the descriptions,[5] I think he will be convinced that this was not the case. The following observation was also made: "Again, the fact that this type of behavior dominated for several days at a time indicates that something more than chance was manifesting itself. At 8 seconds' delay, *e. g.*, Jack made 10 correct reactions in one day, starting with wrong orientations. The following two days had 7 each; and the following two, 4 each. The next day the delay was increased to 9 seconds and 8 correct reactions with wrong orientations were made. Eight, 6, 4, 8, 6 were the records of such reactions for the following days. The next day after these, 10 seconds' delay was given. Here 9 correct reactions were made, starting with wrong orientations. These are fair samples of the prevalence of this type of reaction."[6] To this should be added a careful perusal of Table XI., which considers the relative frequencies of appearance of the two, orientation and non-orientation behavior, for a long period of time. The significant point here is the large percentage of correct reactions out of the total number of responses made with faulty orientation. There was no "error in observation" as Professor Watson fears. It is stated[7] that different persons had operated the release. These persons were graduate students. The reactions were also witnessed by Professor Carr. All of the observers agreed that many times no constantly maintained attitudes could be detected. It would probably have been wise to have stated this explicitly in the monograph.

In Professor Watson's book[8] it is stated that the raccoons may have depended upon olfactory cues derived from the external environment or upon temperature cues. Watson is right when he says these factors were not sufficiently controlled, *if* he means that more controls might have been used. The writer still holds, however, that considering the external conditions and the types of behavior present (and after all this is the basis for judgment) the above external stimuli of temperature and odor were controlled adequately enough to render valid the deductions drawn. Could the raccoons have been reacting to temperature and olfactory differences which varied in location with the location of the light? The writer thinks not. (1) It was only possible to detect occasionally any temperature change at all due to the presence, for five seconds, of the miniature light. The maximum change detected at any time was 1° C., and this obviously was immediately after the light was turned off and not after a delay of 10–25 seconds. When discussing this[9] the writer did so in a

[5] See "Delayed Reaction," pages 43–46 and 49–50.

[6] *Ibid.*, page 44.

[7] *Ibid.*, page 66.

[8] See pages 225 and 227.

[9] "Delayed Reaction," page 66.

summary fashion, relying upon the reader's remembrance of the behavior described on previous pages.[10] The animal's behavior during delay was not at all conducive to the detection of minute (temperature) and hypothetical (odor) stimuli. The animal was in constant motion about the release box in its attempt to get out. Moreover, the animal oriented immediately upon the presentation of the light. No one observing the responses in the light of the above facts would have entertained the hypothesis that temperature and odor were effective. When the animal was oriented toward the box on the extreme right at the moment of release, while the box on the extreme left was the proper one to choose, the impetus of the animal's efforts to escape carried him practically always half way to the right-hand box. Yet he would wheel and escape successfully, passing the middle box by. The whole reaction is made quickly and with decision.

There is a further factor militating against the possibility of temperature and odor having been functional as cues. The point was in the writer's mind when the monograph was written, but was not utilized as it now seems it should have been. The raccoons were confined in a release whose front, sides, and top were of *glass*. And yet they oriented at once and reacted as above described. This structure was commented upon in the paper (p. 23). It is there stated that another release whose faces were covered with wire was used later in the experimentation. The writer's attention was so occupied with the other and to him sufficient arguments against the utilization of temperature that he neglected to state when the glass release was discontinued. An examination of the diary records kept at the time of the tests shows that the change was made July 12, 1911, approximately nine months after tests had been started with Bob and Betty and just prior to the beginning of the work on Jack and Jill. Let the reader refer to one of these tables.[11] Reading down the first column, he will soon come to the entry "2nd stage 240 86." The change of release was made 61 trials before the close of these 240 trials. It will be seen from this that delays of 30 seconds were made with the glass release.[12] The release box used with the rats was also of glass. A wire one was used with the dogs.

Certainly the most probable cues are not temperature and odor. It is not to be expected that the data and conclusions presented in a new piece of work will be accepted as final until other investigators have carefully verified them.

It is not necessary to enter into a discussion concerning language.

[10] *Cf.* pages 44–46 and 48–51.

[11] Page 83, Table XV.

[12] The wire release referred to in this table is the large wire release described on page 37.

Professor Watson says that raccoons do not possess language habits (p. 227), but he elsewhere in the book (pp. 332–3) recognizes the existence of other than vocal language, *i. e.*, language habits having their locus "in the general bodily musculature." Professor Watson admits (p. 333) that he only believes and does not know that this type of language habit is formed later than the vocal type. Frankly the question can not be definitely answered at present. But if we are to get at the genesis of the idea function or, as one might say, the "language habits of the body" and if we are to find out whether or not this appears prior to the genesis of vocal language (*i. e.*, in the animals below man), it will, the writer firmly believes, be through an analysis of the delayed reaction.

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SOCIETIES

THE NEW YORK BRANCH OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION

THE New York Branch of the American Psychological Association met in conjunction with the Section of Anthropology and Psychology of the New York Academy of Sciences on November 23, at Columbia University. The following papers were read:

Some Aspects of Emotional Reactions.—WAYNE P. SMITH.

Importance of Emotion.—Psychological study is beginning to confirm common observation as to the significance of the feelings and emotions in behavior. Educational practise has been in advance of educational theory, for it has sought to utilize feelings and emotions in development of sane and efficient social workers. It has recognized that things that affect or evoke emotional reaction and tend to get more immediate motor response command more thorough consideration and interpretation than do those without this "appeal" or emotional character. From feeling, as the elemental evaluation of things for life, springs inquisitiveness, or the whole knowledge process. The chief function of knowledge seems to be to clarify, that is, to emphasize and unify in a larger perspective, the values of things to which response is to be made.

Conditions of Emotional Reaction.—Emotivity depends, first, upon the nature of the individual as determined by race, sex, age, environment, and disposition; second, on the state of the individual as determined by fatigue, health, inertia, and the functioning of certain organs, especially the cerebral cortex, the skin, certain sense organs,

and the alimentary canal, sexual organs, certain "ductless" glands, the circulatory and, in a possibly less degree, the respiratory systems; third, by certain psychic conditions as attitude, interest, preoccupation, suggestibility, psychical habits of relatively dependable character in presence of certain emotive stimuli, and finally the interpretation of the situation. All the conditions that contribute to euphoria and dysphoria are involved likewise in the emotional reactions of an individual.

In a more specific way emotional reaction depends upon the kind and degree of organization of an individual. This varies from one pole to the opposite. One extreme type is almost chaotic, incoherent, impulsive, and explosive, indiscriminately responsive to all sorts of stimuli. The other extreme is highly centralized, exclusively narrow, mono-idealistic or *idée fixe* in character. In the latter class all vital tendencies and interests are dominated through repression, or perversion, by a single zone which has a hair-trigger responsiveness to suitable emotional stimulation. Outside this zone such an individual shows apathy, a kind of poise, and a comprehensive *"nil admirari"* attitude. Variations of this type may be found not only in industrial fields where occupation and circumstance may be responsible, but also in such fields as religion, art, morality, even science and philosophy. Organization tends to establish almost insuperable psychic barriers against all stimuli external to the particular zone of interest.

Emotivity is also determined by degree of "intellectual control," and this is not to be confused with "organization" just cited. In those in whom intellectual control is most highly developed, all emotive excitations are taken as problems of knowledge. Even "shocks" are effectually dealt with by a system of psychic defenses and controls. A standard of "emotionless" behavior may obtain. There are, of course, many variations from the extreme. A general statement may be made that "emotivity varies inversely as intellectual control."

Function of Emotional Reaction.—Psychological research shows that emotional reactions have a valuable positive as well as an apparently negative function. They are more important than to serve merely as symptoms or psychic effects of sensory and motor excitation. They have a causative function as recent investigation shows. The function may be summarized as follows. First, emotions of the more intense kind signalize the compresence of several motor tendencies which, evoked by the perception of the situation, are incoordinate, mutually conflicting, and inhibitory in their struggle for expression. They are, moreover, inhibitory of immediate overt action, in very large measure, at all events, by the organism. Such immedi-

ate emotive responses as usually occur may be means of protection or communication or mere vestiges of acts that have survived the period of their utility. Among these acts may be mentioned convulsive movements, "freezing," cries or growls, trembling, facial contortions, and flushing or pallor of face, hair standing on end, parched mouth, and throat, and so on: many more or less prophylactic or communicative, but some certainly belonging to levels of behavior not adapted to the present.

Second, emotional reactions make possible and necessary novel and more satisfactory mode of behavior. Momentary inhibition of gross organic response by emotion allows a rapid survey of the situation and incited motor tendencies, both old and new, and a selective organization of these tendencies into a fit plan of action. This clarification of the situation as a whole is accompanied by a gradual subsidence of intense emotion into a vigorous emotional tinge that reinforces and "moves" the whole organism to action. The outcome of the plan reflexly qualifies the remembered experience as "emotional meaning" which is utilized in future experience.

Third, emotion not only reinforces and gives ultimate directness and quickness to the plan of behavior adopted, but it also sets free energy and makes it available for immediate consumption. Old accounts say that emotion animates and invigorates with the heat and flush of swiftly-flowing blood, "anger sweetens the blood," reveals a sense of new and greater powers and a faith and zeal that carry one to successful issue. Experimental researches support this popular idea.[1] It is fairly to be inferred from data available that "big" emotions, especially as fear, anger, and possibly love, stimulate through sympathetic connections certain organs as the thyroid and the adrenal glands. The stimulation of the adrenals effects secretion of adrenalin in the blood, which at once accelerates heart action and circulation of blood, changes the chemical nature of the blood and size of blood vessels, sets free in more than usual amount "blood sugar" from the liver which, with the increased supply of oxygen through quickened respiration, provides with necessary energy whatever parts of the organism are concerned in the work to be done. These emotions also by influence upon other glands and organs suppress temporarily alimentary and other processes not serviceable in the given crisis of behavior. The sense organs may be made hypersensitive or partly suppressed. Mobilization and utilization of energy is the essential business of certain emotions. Other processes are held in abeyance. The organism is delicately and accurately adaptable to situations that

[1] See among others the accounts of physiological experimentation of Benedict and Cathcart, F. S. Locke, Vincent, Sherrington, Schäfer, Bickel and Sasaki, Cannon, Pawlow.

affect it. The emotions are instrumental in facilitating adaptation, in setting free extra energy, and in "moving" the whole organism to the efficient achievement of the work that must be done.

Fourth, with the development of an individual, emotional reactions tend to lose their "bigness" and intensity in some measure and, in combination with other factors, to be sublimated into attitudes and sentiments of dependable character and utility in behavior. Emotional as well as other aspects of experience are susceptible of organization into psychic controls. Such controls are modesty, sympathy, love, loyalty, patriotism, and other familiar sentiments. With this feature of emotion education is especially concerned.

Motor-Emotional Expression of an Infant.—GARY C. MYERS.

The report was based on a rather extensive observation of a baby's emotional expression by the arms and legs, during his first year. If the behavior of the child studied is typical, it seems that pleasurable movements are at first random, due, perhaps, to lack of coordination of the moving members. Soon these movements became alternate. In this case, the one member of the pair, being stimulated to response, consequently suffers fatigue, and the other member, due to gradually coordinating motor pathways, takes up the movement, which in turn shifts to the first again, etc., until both are accumulatively fatigued, or the stimulus is too weak to elicit a response, or both. Then, with development, each member of the moving pair becomes less susceptible to fatigue, and, in accordance with the law of habit, tends to repeat its own movement, resulting in rhythmical, successive movements by the same limb. Later the coordination, in greater perfection, provides unified expressions by pairs of the limbs. Finally, single movements of either member of the pair may be set up in response to a strong feeling, or the unified movements may be more speedy and graceful. Therefore, the character and speed of motor emotional reactions by the limbs are determined by the degree of coordination of the members of the moving pairs.

Motor-emotional expressions are apparently the most primitive as well as the most fundamental. These movements seem to serve as drill exercises to discipline the limbs into definite forms of motor reactions out of which grow the useful and voluntary acts of the individual.

Aside from the movements of the first few weeks, emotional expressions by the limbs tended to occur in successive series, with the number of movements per series varying from 1 to 18 and with a central tendency of from 3 to 5 per series. Between the series the interval of time was but a little less than the total time for the series. The rate of movement increased with the increase of motor coordination.

These (rhythmical) movements began on the left side, then were transferred to the right. For example, the left hand began a regular drumming movement on the 123rd day; the right hand began the same type of movement on the 141st day; the left leg, 139th day; right leg, 143rd day. Unified movements by the legs began on the 148th day, and were well developed by the 189th day. Unified movements by the arms began the 177th day and were well developed by the 247th day.

However, the transition from one type of movement to another was gradual; and while new movements for emotional expression became more numerous as time went on, the old movements were occasionally revived and seem never wholly to have died out.

Pleasure tends to induce and accelerate activity and displeasure to inhibit and retard activity. Pleasurable motor expressions tended to reach their maximum and to cease at an appreciable interval before the real pleasurable experience which was in anticipation, *i. e.*, anticipation at its climax seemed to give greater pleasure than the real experience of the thing anticipated.

Unified hand movements, which, by the last few months of the year tended to be toward each other, ceased at the end of the series, with the hands coming together, palm to palm. As the speed and force of these movements of pleasure increased, they finally came together with a clap, and gradually, instead of the introductory unified movements, there developed the regular clapping of the hands as expression of a high degree of pleasure. Therefore, one of the most primitive expressions of pleasure is applause.

The Logic of Intermediate Steps.—H. L. HOLLINGWORTH.

A familiar form of argument in the natural sciences, especially in biology, psychology, and anthropology, is based upon the evidence afforded by the existence of intermediate stages between two conditions, types or processes whose nature or origin is in question. The existence of such intermediaries is commonly held to indicate that the two extremes are either identical in essence or structure, or at least that the one is a direct development of and evolution from the other. The final abandonment of this serial argument in biology was pointed out. Numerous instances from anthropology and psychology were cited in which the argument is still relied on. The nature of the fallacy was elaborated and the inadequacy of the principle of intermediaries emphasized.

Experiment versus Court Decision.—RICHARD H. PAYNTER.

The purpose of this study is to report an experiment on the confusion between trade-names and their imitations, and to compare the results with legal decisions. The decisions of the legally allowable

amount of similarity, confusion, or deceptiveness between the trade-names and their imitations were rendered by judges of state and federal courts, and by commissioners of patents. Cases in which technicalities or other circumstances entered to influence the judgments as expressed in the decisions are not under consideration. Legally a "probability of deception" constitutes an infringement. But since the phrase "probability of deception" has a variable meaning and has not been objectively measured, it is merely an individual subjective standard, though often couched in concrete terms. On the other hand, experiment actually measures the probability of deception between two trade-names by the per cent. of individuals deceived by the imitation. Thus, by determining to what extent the scores of the infringements are psychologically more confusing than those of the non-infringements, experiment can state the reliability of decisions.

Recognition was the method used. Thirty-nine cases were studied, twenty-four being infringements and fifteen non-infringements. Two groups of subjects were tested, the uninformed and the informed. There were ten men and ten women in each group. Each test contained imitations of original trade-names shown in the presentation, exact duplicates of others, and new trade-names. In the test the subject was asked to pick out those trade-names he recognized as having been just seen in the presentation and those he recognized as not having been just seen. The scores were calculated on the per cent. basis. For example, if fifteen of the twenty subjects in the group were confused by the imitation, recognizing it as having been seen, the confusion estimated between the original and its imitation is 75 per cent.

In the uninformed group the averages of the scores of confusion caused by the infringing and non-infringing imitations are, respectively, 50 per cent. (P. E. 2.9) and 38 per cent. (P. E. 3.0), the medians 45 per cent. (P. E. 2.9) and 40 per cent. (P. E. 3.8) and the modes 45 per cent. for both. Ninety-six per cent. of the total number of infringements are contained between the same limits as the non-infringements, and 80 per cent. of the total number of non-infringements are contained between the same limits as the infringements. If the decisions were all psychologically correct there would not have been any overlapping or only very little. In only 6 cases out of 9 which the experiment showed most easy to judge were the decisions really right. The averages, medians, modes, and great per cent. of overlapping show that the difference between the infringements and non-infringements is so small in comparison with the differences within them as to make the decisions very unreliable. The results of the informed group confirm this conclusion. The recognition

method is recommended for determining the amount of confusion between trade-names, trade-marks, labels, and packages. Besides giving an actual measurement the recognition method will constitute an enormous saving in time, energy, and money over the present legal procedure of the courts and patent-office. Congress, however, in legislating recent trade-mark laws, and the Supreme Court of the United States in interpreting the meaning of infringement as expressed therein, state that a reproduction, copy, or imitation which constitutes an infringement must be a "colorable imitation" or such as is "calculated to mislead." These indefinite and variable meanings of infringement should be replaced by a quantitative statement of the per cent. of individuals which must be deceived.

Demonstration of Psychological Apparatus.—C. HOMER BEAN.

Of the two pieces of apparatus that were demonstrated, one is intended to take the place of Willyoung's troublesome pith-ball weights for the determination of the probable lower limit of least sensitivity to touch. My apparatus is a balance with a tubular glass beam, on the lower side of which is etched a millimeter scale. The relative weights of the two arms of this beam may be varied by sliding a small aluminum rod, that is within the tube, one millimeter for each milligram. The base of the instrument supports the hand or arm comfortably and conveniently during the test. Among the difficulties encountered in the use of the pith-ball weights, that are obviated by this apparatus, are the slowness and the consequent fatigue, the extreme variability of the results and the impossibility of lowering a weight upon the sensitive surface twice in the same manner. In order to avoid the last of these faults in procedure, the balance bar is allowed to come gently into contact with the skin, and is raised from it after a fixed interval by means of a cam that is attached to a slowly vibrating pendulum. This pendulum is started and stopped by the experimenter.

The second apparatus, a maze, was planned as a means of assigning a learning task within the capacities of rodents and higher animals, a task that, nevertheless, requires a large enough number of repetitions to make possible a better analysis of the learning process. The curves derived from the alley maze used by Dr. John B. Watson and others descend so nearly vertically at first and so slowly thereafter as to indicate that each animal has solved a puzzle, discovered a trick, in the first complete reaction, and has nothing further to gain except confidence. The curves obtained from my maze descend rapidly at first, but not abruptly, and later gradually decrease in the rate of fall, as all such curves do when the learner is taxing to its full extent his ability in memorizing. This maze consists of tri-

angular rooms of equal size. The animal no sooner enters a room by means of a door in the middle of one of its sides than it is confronted by the necessity of choosing between doors in its two other sides. One of these doors leads into a "blind" room which has no exit, whereas the other leads through many similar rooms, with their adjacent "blind" rooms, to food and friends. The animal is occupied every moment with conscious reactions because there are no long alleys to be traversed between choices. This kind of maze can be increased or decreased readily in the number of its rooms, easily modified in the direction of its "route," or inexpensively replaced by a duplicate in order to eliminate odor and other disturbing factors. Each choice is different from every other choice; but all are of equal difficulty. Therefore, they may serve as equivalent units for quantitative statement of what an animal has accomplished.

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REVIEWS AND ABSTRACTS OF LITERATURE

Truth and Reality: An Introduction to the Theory of Knowledge. JOHN ELOF BOODIN. New York: The Macmillan Company. 1911. Pp. viii + 334.

The aim of the volume before us, as the sub-title implies, is primarily epistemological. The author promises in the preface to follow it up shortly by another volume on metaphysics, to be entitled "A Realistic Universe," where some problems suggested in this book will be dealt with more fully.

The author's position is already known to the philosophical public, since eleven of the seventeen chapters which make up the volume have already appeared in substantially their present form in various American philosophical journals. Professor Boodin makes open profession of pragmatism, but pragmatism of a very special brand, the pragmatism of William James to whom the volume is fervently dedicated. In fact, one of the chief merits of the presentation is the attempt made to rescue pragmatism as a method and as a theory of truth from the unwarranted developments of the instrumentalists and the humanists. It is safe to say that no other disciple of James has presented his position so fully and so accurately.

The work is divided into four parts, in which are taken up at about equal length the four problems: I. "Truth and Mental Constitution"; II. "The Nature of Truth"; III. "The Criterion of Truth"; IV. "Truth and its Object." Under these captions all the main problems bearing on the nature, function, and verification of reflective thought, to which the

pragmatic controversy has called attention, are not only touched upon, but, for the most part, treated in full.

The plea for philosophical tolerance with which Part I. opens, based as it is on our differences of temperament and the different demands which the various aspects of our nature make on the world, is strongly suggestive of the like indirect plea for pluralism in philosophical doctrines at the opening of James's "Pragmatism." "Why should not every sincere man express his life in a philosophy that seems reasonable to him at the time of its experience now? Thus not only man, but the different moments of man, become the measure of all things . . . Agreement and sameness are practical necessities for the sake of common action, but outside the elementary qualifications for social life they are the bane of progress."

The author's fundamental assumption with regard to the nature of mind, an assumption which dominates the entire volume, is implied in the very title of the second chapter, "Mind as Instinct." This assumption, not phrased in exactly these words by the author, may be elaborated thus: Mind is primarily an active process; consequently its various stages or levels of development, its structure and its forms, must be accounted for in terms of this activity. In explanation of the genetic development of the three main stages of mind this assumption takes on a more specific form: "All our fundamental adjustments or categories, viewed from the point of view of individual development, are instinctive or organic adjustments; the stimuli, which constitute the environment, are simply the occasion for calling into play the structural tendencies of the organic growth series." Corresponding to these stages of development we may expect to find sets of forms or categories which serve as the structural framework of each, and under which, accordingly, knowledge at its various levels is organized. The table of categories, though suggested by Kant, must be corrected by and brought into accord with the splendid work done by recent genetic psychology. The levels of intelligence and the corresponding categories are: (1) The Perceptual Level, with its categories of space, time, and habit; (2) The Level of Reproductive Imagination, involving continuity, similarity, and set; (3) The Level of Empirical Generalization, implying the four syntheses of quantity, quality, cause and effect, and individual interpretation or substance. Just what the relation is between these sets of categories and the genetic stages set forth in the preceding chapter is not made clear. Furthermore, though the author insists, in accord with his fundamental assumption, that intelligence is primarily conative, that intelligence remains an instrument, however elaborate, for fulfilling the demands of the will, the relation of these categories to the volitional activity is not sufficiently elucidated. Are they, like the postulates of truth considered later, posited by some will-to-be-intelligible somewhat after the manner in which Professor Rickert conceives them? or are they stereotyped modes of reacting upon the given material of experience? or are they, as Kant conceives them, the conditions which alone make possible our experience such as it is?

The author could, no doubt, clear up these points by further elaboration. As the presentation stands, it is defective.

In part II., under the caption "The Truth Process," the author differentiates reflective thought from types of meaning of a simpler sort such as perception and associative memory, and from other forms of ideal synthesis, like thought, which involve ideal construction and organization by purpose, such as esthetic wholes; then, after pointing out the limitations of language as an adequate expression of thought, he criticizes some of the recent psychological work on thinking on the ground that the thinking investigated is not real thinking, but only association of ideas. Likewise the discussion with regard to the possibility of imageless thought is bootless since it is not the type of imagery which characterizes thought, but selective leading. The thought attitude implies the active leading or control of processes by a conscious, organized conative purpose. The conative leading constitutes the core of thought, not the imagery. Just as bootless is it to characterize thought by the feeling of effort which accompanies it, but may or may not come to consciousness. The truth process may now be defined more precisely, first with reference to its structure or morphology, secondly with reference to its content. The judgment, the forms of which constitute the morphology of thought, is presented as a fundamental unity of thought moments which starts with negation or the need of fresh adjustment, whether as the result of practical necessities or baffled curiosity; it proceeds through the trial stage of ideal construction and verification (hypothetical judgment), developing in advanced knowledge into the disjunctive schematization of alternates (disjunctive judgment): and its perching-place, after the long or short flight, is the adopting of a provisional scheme for conduct (categorical judgment). The concept thus becomes not the beginning of the thought process, but its terminus. It is the completed form of the categorical judgment at any stage of the history of thought—a conscious definition, a definite programme of action. Turning now to the problem of the content of truth, Professor Boodin accepts Locke's doctrine that the process of truth has to do primarily with the activity of relating. From the standpoint of *psychological* analysis, the attempt to analyze relational consciousness into kinesthetic images and sensations confuses the physiological concomitants and their sensations with the nature of the thought process itself. From the standpoint of *epistemological* analysis, we are confronted with the question whether these relations are to be taken as internal relations or as external relations, a question which plunges us into the controversy which has raged between the neo-realists and the absolute idealists. In solving this problem our author appeals to a principle, christened pragmatic, of which he makes large use in resolving other doctrines which appear to be mutually exclusive—the principle that we must acknowledge the universe to be what we must *take it as*. If now we accept this principle and appeal strictly to our finite experience only, we must take the universe as in part implying internal relations or relations of teleological significance; in part as capable of being taken in terms of external rela-

tions, or at least external to our finite and fragmentary purposes. The pragmatic movement has emphasized the function of truth in relation to life as a whole, the regulative function of thought in experience. But is this the whole story? Does not the truth process always presuppose also certain laws or postulates which, whatever their origin or significance in the structure of the real, must still be acknowledged if thought is to pursue truth? There are four such postulates: the law of consistency, the law of totality, the subject-object law, and the law of finitude. The epistemological necessity of these laws can only be proved by showing that, in the actual social procedure of thought, no instance which does not imply them can be cited without making truth impossible, which would show that they must hold for all cases of truth. They have ontological necessity only in so far as we admit truth as an ontological fact in the universe. Thought, then, we must conclude, is an activity of the will, predetermined as regards its form by certain presuppositions which are posited by the will to think. It is not the only activity of the will. The will may be instinctive in its activity, it may be perceptual, it may be guided by concrete images, it may dream. But when the will sets itself the task of thinking, whether for purposes of practical necessity or for the enjoyment afforded by the game of thinking itself, the will accepts or postulates certain norms, a constitution of thought.

In Part III., by way of introduction to the central problem of pragmatism, the criterion of truth, the author orients us into the movement by sketching its history "From Protagoras to William James." Things exist and are what they are because of the differences they make to human nature—this is the essence of pragmatism. In other words, we can only speak of those things as existent that make a difference to human nature, either directly as immediate experience (the contention of Protagoras), or indirectly as assumptions needed to account for such immediate experience as our perception with its microscopes and telescopes furnishes us (the contention of Plato). Pragmatism may be further defined as scientific method conscious of its own procedure; and if it be maintained that, in this case, it has nothing new to offer, it may be replied that there is always need of a renaissance of the pragmatic consciousness in science. If, now, we attempt to define pragmatism in terms of what it is not, we can show that it does not imply that the true and the useful always coincide; it is not equivalent to humanism, the doctrine that since reality must pass through human nature in order to be known, therefore the nature of reality is made over in knowing it: it is not committed to the instrumental point of view as regards concepts, for truth must always be imitative of its object to a certain extent; it does not necessarily fall on the side of realism except in so far as it intends a world beyond our finite cognitive purposes. Can there be any final distinction between meaning and validity? If we use meaning in the sense of pragmatic meaning—the difference which a situation makes to our further procedure, whether practical or formal—then there can be no final dualism between the meaning of a proposition and its truth. The meaning which molds itself on

the constitution of reality, which leads to the intended consequences, is precisely the *valid* meaning. Though both realists and idealists have joined in maintaining that truth is agreement with reality, they alike fail to break up reality and so fail to show the different meanings of agreement, according as truth is a copying process or an artificial device. Agreement *means* agreement only when we intentionally select with reference to the realization of some purpose. Agreement has a twofold significance: (*a*) the instrumental relation of the knowing attitude to its object and (*b*) that of sharing, to use a Platonic term. (*a*) In so far as reflective thought sets its own conditions, irrespective of the inner meaning of the processes to which it refers, aiming at prediction or control of the object as a means to its own purpose—in so far thought is instrumental. (*b*) But some objects of knowledge must be recognized as having a meaning of their own, a rational purpose and value which we must acknowledge. The fulfilment of our purpose here is conditioned upon partaking of an extra-individual realm of meanings, respecting them and sympathizing with them. Though it is universally recognized now that we must arrive at truth through our human purposes, though human nature with its purposive selection determines the *meaning* of the object, does it, as cognitive, determine the *existence* of the object? No: human nature contributes to nature the significant system of cognitive relations; it does not contribute existence.

In defining the relation between truth and its object in Part IV., the author develops his own standpoint of pragmatic realism. Realism is an epistemological attitude and has to do with the relation of the cognitive meaning to its object. Realism does not deny that objects to be known must make a difference to reflective experience. What realism insists is that objects can also exist and must exist in a context of their own, whether past or present, independent of the cognitive subject; that they can make a difference within non-cognitive contexts, independent of the cognitive experience of which the latter *a posteriori* must take account. In reply to the objection that to think an object is to think it as experienced, therefore it must be experienced—an objection based on the assumption that only like can make a difference to like—the realist insists that there can be different universes of experience which can make a difference to each other; and also that what is non-reflective or non-meaning can make a difference to our reflective purposes, or *vice versa*. Objects, then, enter into different contexts of which we may distinguish three types: the physical context, the social context, *my* context; and each of these contexts can make a difference to one another. In the two final chapters Professor Boodin paves the way for his promised volume on "A Realistic Universe" by making a plea for metaphysics and defining its three main problems, the problems of knowledge, of existence, and of value; and by pointing out the reality of religious ideals. These chapters are suggestive as indicating the direction in which this type of epistemology leads; they are not essential to the main argument of the book.

Professor Boodin agrees with the rank and file of pragmatists in

insisting on the conative, purposive nature of mind, in conceiving of truth as an affair of leading, in making the test of the real that which can make a difference to something else, in maintaining that reality is what we must take it as, in appealing to the immediate. It is primarily in his anti-humanistic and anti-instrumental doctrines that we come upon new points of view: in the distinction drawn between the two types of agreement, instrumental and sharing; in making significance a much narrower term than existence; in the emphasis on the various types of contexts into which the same object may enter. All these doctrines, be it noted, make for realism and away from idealism. The realistic motive dominates the volume.

The appeal to the immediate, usually under some such form as this: "The real is what we must take it as" (Cf. pp. 295, 301) is constantly made. But just what is meant by the immediate is left as vague in this argument as in all other pragmatic writings. In the early part of the book the immediate seems to be identical with the perceptual, as James tends to maintain; later on conceptual construction is included under the immediate; still further on in the argument the immediate is made to include that type of agreement known as sharing. Such ambiguity may make for a pluralistic outlook upon the world; it certainly does not contribute to clear thinking. It is to be hoped that the author will clear away in his later work the fog which as yet envelops the immediate.

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L'Année Psychologique. Edited by HENRI PIERON. Volume XX. Paris, Masson et C^ie^. 1914. Pp. 545.

The twentieth volume of *L'Année Psychologique* contains 545 pages of finely printed material. There are six original *memoires,* six reviews or other minor contributions, summaries of 433 books and articles that appeared during the preceding year in the field of psychology and its related subjects, and several pages of news and notes of current events.

The original *memoires* are by Bourdon, Pieron, Foucault, Gramaussel, Decroly, and Toltchinsky. Bourdon contributes a 16-page study of the delicacy, persistence, and anatomical basis of our sense of rectilinear translation of the body as a whole. Experiments suggest that sensations of rectilinear movement and those of rotation are not furnished by the same sense organ. Pieron, in an 80-page discussion of the law of variation of reaction time, confirms the law of decrease in time with increase in the intensity of the stimulus for different modalities of sensation. The curve is hyperbolic, with determinable constants which are different for the different modalities, depending mainly on peripheral factors having to do with the transformation and diffusion of the stimulus.

Foucault attempts to determine the equation for the curve of work, and to discover the effect of different distributions of trials, in adding. Gramaussel presents pneumographic and plethysmographic records of an infant, taken during its first year, showing correlations between these factors and changes in the direction and degree of the infant's attention.

Decroly describes a new and interesting test, designed to discover and measure aptitude for coordinating complex ideas into a logical theme. Pictures, representing steps in some more or less interesting plot or episode, are presented and it is required that these be arranged in appropriate sequence, so that their story is correctly told. Records are given for groups of school children ranging from 4 to 15 years of age. Toltchinsky studied two point tactual discrimination and certain of its topographic features, under focal and marginal (divided) attention.

In the "Notes and Reviews" section Pieron has a discussion of the sensory memory of the octopus, one on sensation and perception in cutaneous discrimination, another on the Ewald chronoscope, and another on the problem of thinking animals. Wallon reviews and discusses Genil-Perrin's recent book on "Histoire de l'origine et de l'évolution de l'idée de dégénérescence en médecine mentale." Dufour presents two short notes on certain new questions of physiological optics.

Of the 433 articles and books received and summarized in the bibliographical section, 42 are on nervous anatomy and physiology, 51 on psychopathology, 65 on animal behavior and zoological aspects of psychology, 100 on sensation and perception, 19 on applications of psychology; the rest are distributed about uniformly among 10 other rubrics, covering the more general topics. The editor contributes a brief preface.

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JOURNALS AND NEW BOOKS

ARCHIV FÜR GESCHICHTE DER PHILOSOPHIE. April, 1914. *Kant und Epikur* (pp. 257–272): WILLIE SCHINK. Self-determined morality is for Kant the only end-in-itself. Both Kant and Epicurus teach the worth of a happy heart, but with Kant not pleasure, but duty is the driving force of moral action; and joy is only an accompaniment of the ethical life, not the end of living, as it is with Epicurus. *Eine Skizze aus der Philosophie Oesterreich* (pp. 273–287): J. K. KREIBIG.–Bernard Bolzano (1781–1848) was the most important philosopher writing in Austria during the first half of the nineteenth century. Deposed from his professorship by the Catholic chuch, devoted to philosophy and theology, and especially to mathematics, he developed in logic, among other important concepts, the type form *a* has *b;* in epistemology the doctrine of extra-psychological objects and truth; in ethics an altruistic, theistic utilitarianism; in esthetics a valuable critique of his predecessors and worked out the idea that the beautiful is that which gives, without the labor of thinking, an inner glimpse of the satisfying. *Zu Platon und Plethon* (pp. 288–294) J. DRÄSEKE.–Gemistus Pletho (d. 1450) in his "Laws" left at his death a work whose chief outlines appeared as early as 1415, when he had desired to reform his state. Following Blass, Dräseke holds that Plato's "Laws" were written for Sicily's need and dates them about 360 B. C. *Sokrates' Philosophie in der Durstellung des Aris-*

toteles (pp. 295–304): P. BOKOWNEW.–An account of the teaching of Socrates must start from Aristotle, not from Plato or Xenophon. Aristotle represents Socrates as the founder of induction, as the one who gives the definition of many theoretical aspects of ethics, and as a teacher who insisted upon the identity of virtue and knowledge. *La correspondance des genres du Sophiste, der Philèbe et du Timée* (pp. 305–334): L. ROUGIER.–The categories treated in the Sophist are those of the idea of being, in the Philebus those of abstraction, in the Timæus those bearing upon concrete existences. *F. P. v. Herbert* (pp. 335–344): W. SANGE.–An account of the manufacturer Herbert's (1759–1811) news on the Theocracy and suicide. *Rezensionen Die neuesten Escheinungen auf dem gebiete der geschichte der Philosophie. Zeitschriftenschau.*

Drake, Durant. Problems of Conduct. New York: Houghton Mifflin Company. 1914. Pp. xiii + 455. $1.75.

Rashdall, Hastings. Is Conscience an Emotion? Boston and New York: Houghton Mifflin Company. 1914. Pp. xi + 200. $1.00.

Ruhe, Algot and Paul, Nancy Margaret. Henri Bergson: An Account of His Life and Philosophy. London: Macmillan and Company. 1914. Pp. vii + 245. $1.50.

NOTES AND NEWS

SIR E. RAY LANKESTER writes as follows in the issue of *Nature* for December 14, 1914, concerning the death of the eminent scholar, Professor Ingram Bywater:

"On December 18 there died in his house in Onslow Square the greatest Greek scholar of our time. Ingram Bywater was remarkable for the fact that he was imbued with the scientific spirit, and pursued the investigation of Greek thought—what may be called 'the Greek thing'—in the true scientific method. He was in close sympathy with scientific men engaged in other branches of investigation, of the methods and results of which he had a remarkable understanding and appreciation.

"Bywater was born in 1840, and after early days spent at University and King's College Schools, became a scholar of Queen's College, Oxford; then, in 1863, fellow and tutor of Exeter College. On the death of Jowett in 1893 he was appointed by Mr. Gladstone Regius Professor of Greek. It was chiefly through Bywater's influence that Exeter College was led to offer in 1872 a fellowship in the competition for which biology was to be the chief subject. Huxley and Rolleston acted as examiners on behalf of the college, and I had the good fortune to be the successful candidate. My college rooms were adjacent to Bywater's, and we became constant companions and friends. We often discussed—when the college slumbered—the life and learning of the world and our own special studies in a tobacco-parliament of two during the small hours of the night. I learned more from him than I can say, and not only enjoyed his wise and humorous

discourse and his freedom from pedantry, but formed a warm regard for his fine spirit, his wide learning, and his intellectual veracity. When my fellow-student, Moseley—who had not competed for the Exeter fellowship owing to his appointment as naturalist on the *Challenger* expedition—returned from his travels, Bywater proposed that the college should elect him also to a fellowship, which was done.

"In 1885 Bywater married the second daughter of Mr. C. J. Cornish, of Salcombe Regis, widow of Mr. Hans Sotheby, a former fellow of Exeter College. The work of her nephews, Charles and Vaughan Cornish, is well known to scientific naturalists. Bywater was singularly happy in his marriage, and after the death of his wife in 1908 never recovered his strength and vivacity. He resigned his professorship, but still gave his services to the university in connection with the Bodleian and the Press. He lived among his books in his London house, where after my own departure from Oxford in 1898 I was his neighbor and constantly with him as in the old days at Exeter College.

"He had a most unfavorable opinion of the study of Greek as conducted under the examination and scholarship system at Oxford. 'It is not Greek which they study,' he said, 'but an arbitrary and unreal creation of the examination system and the traditions of college tutors.' He complained that when he was professor even those more serious students among the undergraduates who might have profited by his teaching were by college directors of study kept away from his classroom, as they were in earlier days held back from the lectures of Max Müller. Bywater published in 1880 a remarkable piece of research and discovery relating to the fragments of the Greek philosopher Heracleitus, which led to his election as corresponding member of the Royal Academy of Sciences of Berlin. He devoted many years to the criticism of the text of the "Ethics" and the "Poetics" of Aristotle, and in 1899 the Clarendon Press published his *magnum opus,* containing his recension of the text of the "Poetics" with an introduction, translation, and commentary. But the young college tutors had the power of directing their pupils 'not to waste their time' with listening to this great and original investigator, and, instead, to work up their Greek in the examination classes of the colleges; and they exercised it! Such is the mischievous result of the English university dry-rot—the examination system.

"Only a month ago when my friend had temporarily rallied from the illness which has now ended fatally, he discoursed to me in his characteristically cautious yet vigorous style of German (more especially Prussian) arrogance and intrigue and the boasted *Kultur* of the Germans. He said that the quality of their abundant work, never very high, had deteriorated since 1870, and contrasted their grasping and pretentious attitude at the International Conference of Academies in Vienna, where he represented the British Academy, with the charm and refinement of the leading Austrian delegate, Professor Suess, the geologist, now also gone from us, who, he declared, justified his name by the sweetness of both his nature and his behavior."